F1

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Internal Combustion Engine Valve Gear Arrangements

We, REGIE NATIONALE DES USINES RENAULT, a French Body Corporate, of 8/10, Avenue Emile Zola, BILLANCOURT (Seine) FRANCE, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to internal combustion engine valve gear arrangements.

According to the present invention, there is provided an internal combustion engine valve gear arrangement including an overhead cam shaft for acting on a stem of a valve of the arrangement through an intermediate rocker arm having one end that engages the valve stem and having at its other end a swivel joint constituted by first and second elements, the first element being carried by the rocker arm and the second element forming a support for the first element, the arrangement further including a spring arranged to urge the first and second elements into engagement, this spring being engaged with the rocker arm so as to guide the rocker arm during operation.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing, in which:—

Figure 1 is a side view, partly in section, of an internal combustion engine valve gear arrangement,

Figure 2 is a plan view of part of the arrangement of Figure 1,

Figure 3 includes a side view, partly in section, of a modified form of the valve gear arrangement of Figures 1 and 2, and Figure 3 also includes a plan view of part of this modified arrangement,

Figure 4 is a side view, partly in section of another modified form of the valve gear arrangement of Figures 1 and 2, and

Figure 5 is a plan view of part of the modified arrangement of Figure 4.

The valve gear arrangement shown in Figures 1 and 2 includes an overhead camshaft 1 mounted in a cylinder head 2, and a rocker arm 3 for actuating a valve 4 (only part of the stem of the valve 4 being shown). One end of the rocker arm 3 bears against the stem of the valve 4 whilst a screw-threaded rod 5 is screwed through the other end of the rocker arm 3. The screw-threaded rod 5 is formed with a lower swivel-joint head 6 of part-spherical configuration. A nut and lock-nut system 7 is engaged on the upper end of the rod 5 and bears against the upper face of said other end of the rocker arm 3. The part-spherical head 6 swivels in a correspondingly shaped cavity formed in a female joint element 8 secured for example by fitting in the upper surface of the cylinder head 2.

A spring wire 9 of substantially hairpin configuration is threaded in the female joint element 8 to enclose the rocker arm 3, the legs of the spring wire 9 extending through the upper portion of the female joint element 8 in parallel grooves 10 formed therein and the part-spherical head 6 being held captive in the element 8 between the legs of the spring wire 9. As shown, the hairpin spring wire 9 holds the rocker arm 3 in line by engaging the two lateral faces of the arm 3, and it bears with the outer end of its legs on the laterally projecting ends 11, 11^1 of a pin fitted through the rocker arm 3. The resilient pressure exerted by the two ends of the spring wire 9 on the pin ends 11 and 11^1 takes up any play in the ball-joint 6/8 and between the rocker arm 3

and the stem of the valve 4. The valve operating clearance may be adjusted by screwing or unscrewing the rod 5 to vary the position of the rocker arm 3 in relation to the actuating cam on the camshaft 1. Furthermore, in operation, the spring wire 9 serves as a guide for the rocker arm 3, i.e. to prevent any undesired lateral displacement of the latter from the valve stem.

Figure 1 shows, in dotted lines, the rocker arm 3 disposed in its valve-actuating position.

In the modified form of Figure 3, the valve gear arrangement is similar to that of Figures 1 and 2 except that the hairpin spring wire 9 is replaced by a blade spring of loop configuration. One arm of this blade spring is clamped between the upper face of the rocker arm 3 and the lock-nut system 7. The other arm is clamped at its inner end between the upper surface of the cylinder head 2 and the female joint element 8. This other arm is formed with a fork-like extension 13 of which the prongs extend on either side of the rocker arm 3 for guiding same. These prongs also engage, on either side of the rocker arm 3 the projecting ends 11 and 11^1 of the pin fitted through the arm 3. At the root of these prongs a bent lug 14 engages a hole formed in the top of the cylinder head 2, as shown, this engagement being intended to ensure that the orientation of the blade spring is fixed.

It will be appreciated that in this modified arrangement, the blade spring simultaneously takes up any play in the balljoint 6/8, holds the rocker arm 3 in contact with the stem of the valve 4 and guides the rocker arm 3 during operation, as does the spring wire 9 in the arrangement of Figures 1 and 2. In both arrangements, it will be noted, the spring wire 9 or the blade spring engages the rocker arm 3 at a location intermediate the length of the arm 3.

The further modified form of Figures 4 and 5 is also similar to the arrangement of Figures 1 and 2 except that in the modified arrangement of Figures 4 and 5 the rocker arm 3 is formed with an integral cylindrical swivel portion 15 in the form of a male cylindrical trunnion pivoting about its axis in a female bearing 16 slidably fitted in the cylinder head 2. The bearing 16 may be an extruded flanged piece as shown. Adjusting shims 17 may be provided for properly adjusting the valve operating clearance or play. The swivel portion 15 and bearing 16 replace the ball-joint 6/8 and the lock nut system 7. A spring 18, which replaces the spring wire 9, is provided for locking the bearing 16 against rotation and maintaining same in position by inter-engagement of this spring 18 and a notch formed in the bearing 16. As is shown in the drawings, the spring 18 is forked at its lower end, the two arms of this fork bearing on the swivel portion 15 to maintain the portion 15 in the bearing 16. The two arms extend one on either side of the rocker arm 3 to guide the rocker arm 3 during operation.

It will be appreciated that each of the valve gear arrangements referred to above includes a number of rocker arms 3 and components associated therewith although only one arm 3, and its associated components, has been described in each case.

WHAT WE CLAIM IS:—

1. An internal combustion engine valve gear arrangement including an overhead cam shaft for acting on a stem of a valve of the arrangement through an intermediate rocker arm having one end that engages the valve stem and having at its other end a swivel joint constituted by first and second elements, the first element being carried by the rocker arm and the second element forming a support for the first element, the arrangement further including a spring arranged to urge the first and second elements into engagement, this spring being engaged with the rocker arm so as to guide the rocker arm during operation.

2. A valve gear arrangement as claimed in claim 1, wherein the second element forms a female element of the swivel joint.

3. A valve gear arrangement as claimed in claim 1 or 2, wherein the spring is engaged with the second element.

4. A valve gear arrangement as claimed in claim 3, wherein the spring is also in engagement with the first element.

5. A valve gear arrangement as claimed in any one of the preceding claims, wherein the first element comprises a threaded pin which is screwed through the rocker arm to permit adjustment of the arrangement.

6. A valve gear arrangement as claimed in claim 4 or claim 5 as appendant to claim 4, wherein the spring is a hair-pin spring having two legs, the second element having two parallel passages receiving the two legs of the hairpin spring and these two legs extending along opposite sides of the rocker arm from said elements to a location, intermediate the length of the arm, at which the spring engages the arm, the first element being engaged and held captive in the second element between the legs of the spring.

7. A valve gear arrangement as claimed in claim 4 or claim 5 as appendant to claim 4, wherein the spring is a blade spring of loop configuration having an upper arm fixed between the rocker arm and the first element, and a lower arm fixed between the second element and a member supporting the second element, the lower arm extending beyond the second element in the form of a fork-like extension the arms of which extend along opposite sides of the rocker arm from said elements to a location, intermediate

the length of the arm, at which the spring engages the rocker arm.

8. A valve gear arrangement as claimed in claim 7, wherein the lower arm of the spring is provided with a bent lug that engages a hole formed in said member.

9. A valve gear arrangement as claimed in claim 1, wherein the first element is a cylindrical trunnion arranged to pivot about its axis in the second element, and wherein the spring is a forked spring, the two arms of the fork bearing on the cylindrical trunnion and extending one on either side of the rocker arm to guide the rocker arm during operation.

10. A valve gear arrangement as claimed in claim 9 wherein shims are inserted between the second element and a member supporting the second element thereby to set the valve operating clearance.

11. A valve gear arrangement substantially as hereinbefore described with reference to Figures 1 and 2, or Figure 3, or Figures 4 and 5 of the accompanying drawing.

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963995 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG.1

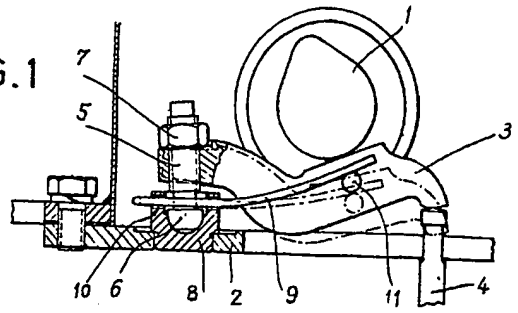

FIG.2

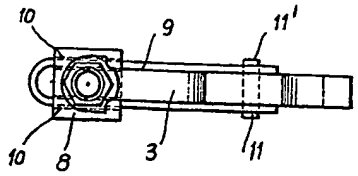

FIG.3

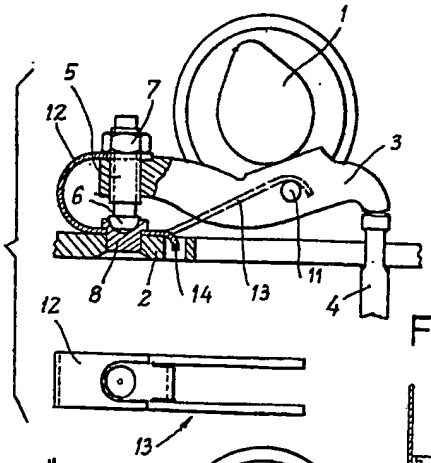

FIG.5

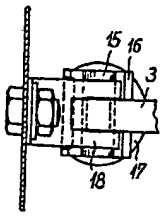

FIG.4